Monday, April 7, 2025
from 4:45 p.m. to 6:20 p.m. (Moscow time)
room 16-10 and ZOOM translation

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Contactization of first-order systems on two-dimensional manifolds

According to Lychagin's results, systems of two first-order nonlinear hyperbolic equations on two-dimensional manifolds generate an almost product structure on a four-dimensional manifold. It is known that the system is equivalent to a wave system with constant coefficients if and only if the Nijenhuis bracket of the corresponding linear operator is zero. Since the solution of such a wave system is known, then it is possible to construct an exact solution of the nonlinear system.

The report will present the results on contactization such systems. Namely, if such system has a non-degenerate conservation law, then it can be associated with a pair of non-integrable distributions on a 5-dimensional contact manifold. This approach expands the class of admissible transformations, which allows us to construct exact solutions of such systems depending on two arbitrary functions. Necessary and sufficient conditions for the equivalence of systems to the wave system with constant coefficients with respect to a pseudogroup of contact transformations will be presented. The results will be illustrated by examples from the theory of filtration in porous media.

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SCIENTIFIC SEMINAR
"DIFFERENTIAL GEOMETRY AND APPLICATIONS"

headed by Academician of RAS Anatoly T. Fomenko

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